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| 09/712,567      | 11/14/2000  | James W. Watts III   | 97.012              | 9421             |

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Mr. Keith A. Bell  
ExxonMobil Upstream Research Company  
(SW-336A)  
P.O. Box 2189  
Houston, TX 77252-2189

EXAMINER

PHAN, THAI Q

ART UNIT

PAPER NUMBER

2128

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/712,567

Applicant(s)

WATTS ET AL.

Examiner

Thai Q. Phan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17-24 is/are allowed.
- 6) ☒ Claim(s) 1-16 and 25-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

1. This Office action is in response to applicants' amendment filed on 07/19/2004.

Claims 1-31 are pending in the Action.

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 25 in the present amendment is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: the claim is incomplete after step (b) (see claim 25 in the present amendment).

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-16, and 25-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Lu et al, US patent no. 6,375,489 B1.

As per claim 1, Lu anticipates a method and system for modeling a physical system by using object oriented programming techniques with feature limitations identical to the claimed invention. According to Lu, the method includes steps

Developing classes of simulation objects (Figs. 12, 24, 25, 29, col. 6, lines 25-48, col. 7, lines 24-40, col. 7, line 53 to col. 8, line 25, for example), wherein the simulation objects including cell group object for visualization (col. 8, lines 17-26), and connection group object (col. 10, line 50 to col. 11, line 4, for example), and encoding object model using object oriented programming techniques and running the program in a computer to determine and to visualize object rendering for modeling system characteristics (col. 26, line 45 to col. 27, line 33, for example).

As per claim 2, Lu anticipates the system comprises a hydrocarbon-bearing subterranean formation (col. 6, lines 23-46, for example).

As per claim 3, Lu anticipates the physical system under modeling containing fluid, the system associated with production of hydrocarbons from subterranean hydrocarbon bearing formation.

As per claims 4-7, Lu anticipates the system is represented by a single model, subgroups of object models based on object characteristics, geometrical shape, cell properties, etc. to render object for visualization (Figs. 9, 12, col. 7, lines 24-41, col. 10, line 50 to col. 11, line 5, for example).

As per claim 8, Lu anticipates an object oriented programming for cell objects, object connection, etc. used to model the system with feature limitations as claimed (col. 27, lines 18-22, for example).

As per claim 9, Lu anticipates grid flexibility to extend to unstructured grid (col. 8, lines 53-64).

As per claims 10-15, Lu anticipates grid cells with structures as PEBI cells, three dimensional cells, cell with flexibility structure, and computation program to link such geometry cell model for simulation. Lu also anticipates hardwares and software required for computation such as CPUs, control software, programming languages, etc. (col. 27, lines 8-33).

As per claim 16, Lu anticipates a method and system for modeling a physical system by using object oriented programming techniques with feature limitations identical to the claimed invention. According to Lu, the method includes steps

Discretizing the physical model into a plurality of volumetric cells (Figs. 12-13),  
Developing classes of simulation objects (Figs. 12, 24, 25, 29, col. 6, lines 25-48, col. 7, lines 24-40, col. 7, line 53 to col. 8, line 25, for example) for transport phenomena, wherein the simulation objects including cell group object (col. 8, lines 17-26), and connection group object (col. 10, line 50 to col. 11, line 4, for example) for presenting the complex system under simulation, and running the program in a computer to simulate physical system behavior or characterizing the physical model such as fluid flow, flow dynamics inside the geoscience system (col. 26, line 45 to col. 27, line 33, for example).

As per claims 25 and 26, Lu anticipates a computer program product implemented in a computation system for performing steps in the method claims 1 and 16 above. According to Lu, the program product includes means for

Receiving and storing in a computer memory a list of objects, and a multiplicity of connection groups (Figs. 9, 12, 22, col. 6, lines 25-48, col. 10, line 50 to col. 11, line 6, for example) for modeling a geosystem model,

Using the objects for the geometric models to simulate behavior of the geosystem for physical characteristics of the system (col. 27, lines 17-22),

and running the object program in a computer to determine property of the fluid material in the system (col. 26, line 45 to col. 27, line 33, for example) and generating the simulation output such as fluid flow, prediction of dynamic flow, etc.

As per claim 27, Lu anticipates the computation system including memory, RAM, ROM, disk, etc. as claimed.

As per claim 28, Lu anticipates a computation system for performing steps in the method claims 1 and 16 above. According to Lu, the simulator includes

A CPU for computing and processing steps of modeling,

User interface to control and command the modeling process above,

Means for receiving and storing in a computer memory a list of objects and a multiplicity of connection groups (Figs. 5, 6, 7, 12, 22, col. 6, lines 25-48, cols. 7-11) for the geosystem model,

Using the objects for the geometric models to simulate and visualize object rendering for the behavior of the geosystem of the physical system,

and running the program in a computer to determine property of the fluid material in the system (col. 26, line 45 to col. 27, line 33, for example) and generating the simulation output such as fluid flow, prediction of dynamic flow, etc.

As per claims 29-31, Lu anticipates object model, submodels, cell groups, and connection groups as claimed (col. 7, line 25 to col. 8, line 5, col. 9, line 63 to col. 11, line 32, for example).

***Allowable Subject Matter***

5. Claims 17-20 and 21-24 are allowed. Following is examiner's statement reason for allowance subject matter.

Independent claims 17 and 21 are directed to a method and system for simulating fluid flow in a hydrocarbon-bearing reservoir and its associated wells and facilities in a geophysical system. The claims require steps and means for "constructing a cell-group object associated with each said group of cells, said cell-group object containing information required by its associated group of cells"; "assembling sets of equations governing fluid flow and energy transport through the said connections between pairs of said cell"; "constructing a connection-group object associated with each said group of connections, said connection-group object containing information required by its associated group of connections", and " (h) simulating fluid flow and energy transport by using said cell-group objects and connection-group objects to compute properties of fluids contained in each cell and to compute flow of fluids and transport energy through connection".

***Response to Arguments***

6. Applicant's arguments filed July 19, 2004 to the rejected claims have been fully considered but they are not persuasive.

In response to applicants' argument Lu does not anticipate or disclose cell group objects and connection of cell objects (Remarks, on page 7, last paragraph and page 8), the examiner disagrees with. Lu anticipates classes of simulation objects (Figs. 12, 24, 25, 29, col. 6, lines 25-48, col. 7, lines 24-40, col. 7, line 53 to col. 8, line 25, for example), wherein the simulation objects including cell group object for visualization (col. 8, lines 17-26), and connection group object (col. 10, line 50 to col. 11, line 4, for example), and programming the cells objects and object connection in object oriented programming (Fig. 12, col. 10, lines 10-65, col. 27, lines 17-22), running the object program in a computer to determine and render for visualization of object property in the fluid material in the system (col. 26, line 45 to col. 27, line 33, for example).

In response to applicants' argument Lu does not anticipate or disclose connection object for fluid flow and energy transport functions in the connection object (Remark, page 8), the examiner responds such features are not present in the rejected claims for consideration.

### ***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any



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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thai Q. Phan whose telephone number is 571-272-3783.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached on 571-272-3780. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nov. 24, 2004



Thai Phan  
Patent Examiner,  
Art Unit 2128